

## THE HUMERUS OF *XENICIBIS*, THE EXTINCT FLIGHTLESS IBIS OF JAMAICA

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*Abstract.*—The first known complete humerus of the extinct fossil ibis *Xenicibis xympithecus* is reported from a new locality in Jamaica. The specimen exhibits many of the morphological characteristics seen in flightless birds and possesses a number of characters which distinguish it readily from all other ibises.

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At the time of our description of the extinct ibis *Xenicibis xympithecus* (Olson and Steadman, 1977) from a Quaternary deposit in Long Mile Cave, Trelawny Parish, Jamaica, a fragmentary shaft of a humerus was the only element of the wing available. In this, part of the distal end of the deltoid crest was preserved, and its morphology, along with that of the paratypical coracoids, led us to the conclusion that *X. xympithecus* was flightless. Shortly after reading proofs of our paper, we were apprised of an unfamiliar humerus among a collection of Jamaican fossils at the University of Florida. Upon comparing this specimen with the paratypical humeral fragment (AMNH 11031), we found the same diagnostic twisting and flattening of the shaft in both and, except for the paratype being slightly more robust, the two are similar in all other details as well. As there is hardly any possibility of there being two different species of flightless birds in Jamaica of the same size and with the same details of the humerus, we conclude that the new specimen must pertain to *Xenicibis xympithecus* and it is therefore of importance in further elucidating the morphology of the wing of this bizarre form.

The specimen (Figs. 1 and 2) is a complete and beautifully preserved right humerus (Florida State Museum UF 23768) collected from Swansea Cave I (Hole 3, L3) near Worthy Park, St. Catherine Parish, Jamaica, by T. H. Patton in June 1966. This locality is near the center of the island and lies about 57 airline km ESE of the type locality. McGrath (1960) provides a map and general description of Swansea Cave, but makes no mention of any fossiliferous deposits. The age of the deposit in question is not known and we can only assume it to be Quaternary.

As with the type material of *X. xympithecus*, we compared this specimen with a synoptic series of humeri of Recent non-passerine families of birds, finding it to be most similar to ibises (Threskiornithidae). Although in a number of ways unique, this humerus shows several distinctive characters



Fig. 1. Right humeri in palmar view. a, *Apteribis glenos*, B. P. Bishop Museum BBM-X 147240; b, *Xenicibis xympithecus*, Florida State Museum UF 23768; c, *Eudocimus albus*, USNM 500883. All figures natural size.

which in combination indicate certainly that the bird formerly possessing it was flightless: slender twisted shaft, very deep brachial depression, bicipital crest reduced, deltoid crest reduced in area, thickened, and twisted; external tuberosity reduced and displaced distally.

The new specimen is longer than the humerus of *Eudocimus*, *Plegadis*, or *Mesembrinibis*, but is shorter than that of *Threskiornis*, *Harpiprion*, *Theristicus*, *Hagedashia*, or *Platalea*. Because elements of the hindlimb of *Xenicibis* are larger than in any of these genera, the size of the humerus must be small relative to the size of the bird, as would be expected in a flightless species.

The measurements of the bone are as follows: overall length 112.6 mm, width of proximal end 23.0, depth of head 7.8, length of deltoid crest from



Fig. 2. a-d, right humerus of *Xenicibis xympithecus*, UF 23768; a, palmar-internal view; b, internal view; c, external view; d, anconal view. e, paratypical fragment of shaft of right humerus of *Xenicibis xympithecus*, AMNH 11031. All figures natural size.

proximal surface of external tuberosity 27.0, least width of shaft 6.2, width of shaft at midpoint 7.1, depth of shaft at midpoint 5.8, width of distal end 16.2, depth through external condyle 10.0, greatest diameter of brachial depression 9.8.

Compared to extant genera of ibises, the humerus in *Xenicibis* has the shaft much more slender and greatly curved both latero-medially and dorso-ventrally. The shaft is twisted and becomes peculiarly flattened in the portion beginning between the deltoid crest and the midpoint of the shaft and continuing distally for about 30 mm. In anconal view the head is large and deep, extending much farther distally than in other genera. The capital groove is much deeper, longer and more distinct. Beneath the internal tub-

erosity is a single small, oval, well-defined pneumatic foramen, unlike the ill-defined and more cancellous pneumatic foramina of extant ibises. The external tuberosity is reduced, forms a much steeper diagonal slope with the head, and is marked by a distinct pit on the anconal surface. The center of the anconal surface of the shaft just distal to the head and the internal tuberosity is markedly concave. The point of attachment of *M. latissimus dorsi posterioris* is marked by a distinct oval pit, 3.2 mm long, whereas in all other ibises this is a raised prominence. The bicipital crest and attachment for *M. scapulohumeralis caudalis* are greatly reduced; in extant ibises the bicipital crest extends distally well beyond the level of the internal tuberosity, whereas in *Xenicibis* the area of the internal tuberosity in anconal view nearly obscures the bicipital area. The deltoid crest in *Xenicibis* is small but thickened, with the area of the pectoral attachment bearing a protuberance. At the distal end, the brachial depression in *Xenicibis* is much more extensive and much deeper than in any other known ibis, occupying most of the width of the shaft. Likewise, there is a much deeper depression between the attachment of the anterior articular ligament and the internal condyle. In external view the attachment of the anterior articular ligament is more reduced and more distally situated, and the external condyle protrudes more palmarly than in other ibises. The olecranal fossa is deeper in its distal portion, while the entepicondyle is less elevated anconally above the tricipital grooves than in extant ibises.

The only other flightless ibis discovered is *Apteribis glenos* Olson and Wetmore 1976, from the islands of Molokai and Maui in Hawaii. The humerus of this form (Fig. 1a) shows many of the same modifications as that of *Xenicibis* but differs greatly in other respects as follows: shaft more robust, rounded, and much less curved; head more elongate, without distal projection; pneumatic foramen absent; external tuberosity without pit on anconal surface; internal tuberosity with long axis nearly perpendicular to shaft, not parallel; deltoid crest more swollen; attachment of *M. latissimus dorsi posterioris* not concave; entepicondylar area more pointed, projecting farther internally; brachial depression much smaller and shallower.

Unfortunately, the humerus of *Xenicibis* is so greatly modified that it sheds no light on the relationships of this enigmatic genus. The new locality record reported here suggests that *X. xympithecus* was once widespread in Jamaica. Its remains can be expected in cave deposits elsewhere on the island.

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